



## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 91

[Docket No. FAA-2022-0619]

### Statement of Policy on Performance Requirements for Operators of Aircraft that are Equipped with Automatic Dependent Surveillance-Broadcast (ADS-B) Out

**AGENCY:** Federal Aviation Administration (FAA), Department of Transportation (DOT).

**ACTION:** Policy statement.

**SUMMARY:** This action announces revisions to the FAA's policy on performance requirements for aircraft with Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment using the Selective Availability (SA)-Aware receivers in ADS-B rule airspace. The FAA will no longer expect aircraft with this equipment to perform a preflight availability prediction before operating in ADS-B rule airspace.

**DATES:** The policy described herein is effective [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER].

**FOR FURTHER INFORMATION CONTACT:** For technical information concerning this action, contact James Marks, Flight Technologies and Procedures Division, Aviation Safety, at (202) 267-8790.

### SUPPLEMENTARY INFORMATION:

#### Authority for this Action

The FAA's authority to issue rules on aviation safety is found in Title 49 of the United States Code (49 U.S.C.). Subtitle I, Section 106, describes the authority of the FAA Administrator. Subtitle VII, Aviation Programs, describes in more detail the scope of the agency's authority.

The ADS-B Out equipage and performance requirements in §§ 91.225 (Automatic Dependent Surveillance-Broadcast (ADS-B) Out equipment and use) and 91.227 (Automatic

Dependent Surveillance-Broadcast (ADS-B) Out equipment performance requirements) of title 14 of the Code of Federal Regulations (14 CFR) were promulgated under the authority described in Subtitle VII, Part A, Subpart I, Section 40103 (Sovereignty and Use of Airspace) and in Subpart III, Section 44701 (General Requirements). Under Section 40103, the FAA is charged with prescribing regulations on the flight of aircraft (including regulations on safe altitudes) for navigating, protecting, and identifying aircraft and the efficient use of the navigable airspace. Under section 44701, the FAA is charged with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce.

In § 91.227, the FAA set forth the ADS-B Out equipment performance requirements including accuracy and integrity performance standards. This policy statement is within the scope of the FAA's authority and informs operators equipped with Selective Availability (SA)-Aware receivers about a change to the FAA policy requiring they perform preflight availability predictions to ensure their avionics broadcast elements required by § 91.227 as part of their § 91.103 (Preflight Action) obligations.

## **I. Background**

In 2010, the FAA issued a final rule prescribing equipage requirements and performance standards for ADS-B Out avionics on aircraft operating in certain airspace after January 1, 2020.<sup>1</sup> ADS-B Out is an advanced surveillance technology that combines an aircraft's position source, other aircraft avionics, and a ground receiver infrastructure to create an accurate and shared surveillance picture between aircraft and air traffic control (ATC). ADS-B Out provides air traffic controllers with real-time position information that is, in most cases, more accurate than the information available with current radar-based systems. With more accurate information, ATC will be able to position and separate aircraft with improved precision and timing so that

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<sup>1</sup> Final Rule, Automatic Dependent Surveillance-Broadcast (ADS-B) Out Performance Requirements to Support Air Traffic Control (ATC), 75 FR 30160 (May 28, 2010).

efficiency and capacity will increase beyond current levels to meet the predicted demand for ATC services while maintaining or improving safety.

### **ADS-B Position Sources**

Aircraft with ADS-B Out equipment continually broadcast information, such as identification, position, altitude, and velocity, through an onboard transmitter, which can be received by ADS-B ground stations (or satellite receivers) and by other aircraft appropriately equipped to receive this information. The ADS-B Out rule specifies the aircraft's ADS-B Out equipment performance requirements for each flight in rule airspace rather than requiring any particular type of position source. All currently approved position sources rely on a Global Positioning System (GPS) receiver.<sup>2</sup> The quality of each type of receiver can be described by its "rule performance" availability, which means the GPS receiver's ability to achieve the performance requirements of § 91.227(c)(1)(i) and (iii) for navigation accuracy category for position (NACp) and navigation integrity category (NIC). Technical Standard Order (TSO)-C166b and TSO-C154c contain the avionics standards for outputting NACp and NIC.

### **FAA ADS-B Service Availability Prediction Tool (SAPT)**

The ADS-B Service Availability Prediction Tool (SAPT) is a preflight resource developed by the FAA, that predicts the ability of standard GPS receivers to meet the requirements of § 91.227(c)(1)(i) and (iii) along a given route of flight. This prediction is based on the ability of the aircraft's position source (e.g., GPS receiver) to meet ADS-B performance requirements based on the type of GPS receiver (FAA TSOs C129, C129a, C145c/C146c, and C196) and the predicted status of the GPS constellation. The SAPT also evaluates if backup surveillance is available where position source performance is predicted to fall below requirements.<sup>3</sup> The ADS-B SAPT is primarily intended for pilots, dispatchers, and commercial

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<sup>2</sup> GPS is a specific type of Global Navigation Satellite System (GNSS).

<sup>3</sup> FAA plans to begin divestiture of some radar infrastructure as part of the transition to a satellite-based navigation and surveillance system. During the period from 2020 to 2025, FAA's planned radar divestitures will focus primarily on eliminating redundant/overlapping radars.

operators to verify their predicted position source performance before flight and ensure compliance with the ADS-B Out rule.<sup>4</sup>

### **Exemption No. 12555**

In April 2015, Airlines for America (A4A) petitioned the FAA, on behalf of A4A member airlines, for an exemption from the Navigation Accuracy Category for Position (NACp) and Navigation Integrity Category (NIC) requirements of the rule. A key premise of the exemption was an understanding that certain position sources were more likely than others to not perform at the required level established by the ADS-B Out rule. In August 2015, the Administrator issued Exemption No. 12555,<sup>5</sup> a time-limited grant of exemption from § 91.227(c)(1)(i) and (iii) for the period from January 1, 2020, through December 31, 2024. Exemption 12555 permits operation of aircraft equipped with TSO-C129 (SA-On) and TSO-C196 (SA-Aware) in ADS-B Out rule airspace during periods when the GPS position provided to the installed ADS-B Out equipment does not achieve the required accuracy or integrity performance, provided certain conditions and limitations are met. Additionally, Exemption 12555 does not require aircraft equipped with SA-Aware GPS receivers to use a preflight availability prediction tool.

### **2019 Policy Statement**

On July 3, 2019, the FAA published a Federal Register document with its policy on performance requirements for operators equipped with ADS-B Out, including those equipped with a SA-Aware position source.<sup>6</sup> The FAA found that Wide Area Augmentation System (WAAS)<sup>7</sup> was the only GPS position source that consistently provided the equivalent availability

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<sup>4</sup> For more information on the SAPT, the FAA has developed the ADS-B SAPT/Receiver Autonomous Integrity Monitoring (RAIM) User Guide, which is available at: <https://sapt.faa.gov/adsb-start.php>.

<sup>5</sup> Regulatory Docket Number FAA-2015-0971 (FAA Exemption No. 12555) at <https://www.regulations.gov/docket/FAA-2015-0971>.

<sup>6</sup> Statement of Policy on Performance Requirements for Operators of Aircraft That are Equipped with ADS-B Out, 84 FR 31713 (July 3, 2019).

<sup>7</sup> WAAS is a regional a space-based augmentation system (SBAS) operated by the FAA.

to radar at 99.9 percent availability.<sup>8</sup> The FAA also believed that SA-Aware receivers could meet a similar 99.9 percent availability as long as there was no significant reduction in the GPS satellite constellation. Given since the data at the time of publication of the 2019 policy was limited, the FAA determined that aircraft equipped with GPS position sources such as Selective Ability-On (SA-On or SA-Aware were more likely to experience performance outages that limited their access to the airspace defined in the ADS-B rule.

The 2019 policy statement reiterated § 91.103's requirement that pilots become familiar with all available information concerning a flight. The FAA explained that given the previously identified limitations of SA-On and SA-Aware receivers, the use of a preflight prediction tool is a reliable way of satisfying due diligence requirements under § 91.103. Therefore, these operators were required to confirm that a planned route of flight would comply with the ADS-B performance requirements in § 91.227(c)(1)(i) and (iii). Operators could use any reliable preflight prediction tool, with the SAPT providing a comprehensive and reliable preflight prediction for operators. The policy statement explained that for operators who had been notified by the FAA of consistent and repeated ADS-B Out performance issues, conducting an operation in accordance with the policy without first redressing the identified non-performance issue would be considered a continuation of the non-compliance with the performance requirements. Also, if an operator failed to conduct a preflight availability prediction for the operator's intended operation and subsequently encountered degradation of GPS performance that resulted in the aircraft falling below the performance requirements of § 91.227(c)(1)(i) and (iii), that operator would be deemed to have violated the ADS-B rule—even if the operator's flight were to be rerouted due to unforeseen circumstances.

## **Performance Based Operations Aviation Rulemaking Committee (PARC) Exemption**

### **12555 Action Team**

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<sup>8</sup> FAA also determined that certain GPS tightly integrated with inertial navigation systems would also provide 99.9 percent availability.

In August 2020, the FAA tasked the PARC to form an action team comprised of industry stakeholders and FAA subject matter experts to report on the following:

1. Identify barriers and appropriate mitigations to air carrier Exemption 12555 equipage plans that lead to full compliance with § 91.227; and
2. Describe status of applicable equipment availability relative to achievement of operator equipage plans toward end state of Exemption 12555 on December 31, 2024.

The PARC provided a forum for the U.S. aviation community to discuss, prioritize, and resolve issues, provide direction for U.S. flight operations criteria and produce U.S. consensus positions for global harmonization on performance-based airspace operations. The PARC action team requested that the FAA provide a report on ADS-B Out equipped aircraft with approved position sources and their ability to meet the equivalent operational availability of radar (99.9% or greater availability requirement). In addition to the 4 years of data used to support the 2019 policy document, an additional 3 years of position source performance data was given to the PARC action team to analyze.

FAA analysis and prior modeling in support of the ADS-B Aviation Rulemaking Committee indicated that the critical ADS-B quality parameter was the NIC parameter defined in § 91.227(c)(1)(iii). FAA data indicated a historical operational availability with regard to required NIC rule performance for the following ADS-B position source types:

- SA-On GPS receivers achieved between 98-99% operational availability;
- SA-Aware GPS receivers achieved 99.9%, or greater, operational availability; and
- Satellite-Based-Augmentation System (SBAS) receivers achieved 99.9%, or greater, operational availability

In consideration of these findings, the PARC Exemption 12555 action team recommended removing the requirement for aircraft equipped with SA-Aware GPS receivers to use a preflight availability prediction tool (e.g., the Service Availability Prediction Tool (SAPT)).

The FAA agrees that the demonstrated performance of SA-Aware GPS receivers has been equivalent to, or better than, a single radar since the FAA began monitoring ADS-B performance in 2015. Years of additional data and assurances that the GPS constellation will remain at current levels have given the FAA confidence that SA-Aware GPS receivers will consistently provide the availability required by the ADS-B regulation. The FAA accepts any residual risk associated with SA-Aware GPS receiver performance falling below the regulatory requirement. As such, the FAA is adopting the subject PARC Exemption 12555 action team recommendation and is revising preflight policy issued in 2019 for aircraft equipped with SA-Aware GPS receivers in this document.

## **II. Discussion of the Policy**

### **Preflight Availability Prediction Policy**

Given the demonstrated performance of SA-Aware (TSO-C196) GPS receivers over a seven-year monitoring period and the expectation that the GPS constellation will provide coverage at current levels for the foreseeable future, the FAA now finds that such GPS receivers consistently provide an equivalent availability to that of a single radar at 99.9 percent operational availability. Aircraft equipped with SA-Aware GPS receivers during periods of GPS constellation degradation that negatively impact the ability of ADS-B Out equipment to meet performance requirements associated with the rule will be deemed compliant with the ADS-B Out rule requirements. Therefore, the operators of aircraft equipped with position sources that meet the performance requirements of TSO-C196 (SA-Aware) is not required to perform a preflight availability prediction to fulfill their § 91.103 due diligence obligation. For aircraft equipped with GPS receivers that do not meet the performance requirements of TSO-196 or TSO-C145/146, the operator must run a preflight prediction.

Due to the reduced performance of SA-On receivers relative to ADS-B rule requirements, operators of aircraft with these receivers are expected to use a preflight availability prediction

tool to predict the ability of an aircraft position source to meet the performance requirements of § 91.227(c)(1)(i) and (iii) along a given route of flight. For non-exemption holders with SA-On receivers and exemption holders after expiration of Exemption 12555, a preflight availability prediction tool should be used to comply with § 91.103 due diligence requirements for a planned route of flight in ADS-B rule airspace. If the predicted SA-On receiver performance does not support compliance with § 91.227 for the proposed flight, the FAA expects operators to adjust the flight plan (e.g., departure time, route) as needed to avoid any areas or time periods predicted with degraded GPS performance. Holders of Exemption 12555 are expected to follow the conditions of that exemption until it expires on December 31, 2024.

After an operator receives a satisfactory preflight availability prediction for an intended operation, there may be certain conditions that warrant a subsequent prediction. For example, a change in departure time or a change in the satellite constellation as indicated by a Notice to Air Missions (NOTAM) may have an effect on the predicted GPS performance for the intended operation. If an operator becomes aware of a change that could result in degraded GPS performance prior to receiving an initial ATC clearance for the intended route of flight, the operator should – consistent with preflight action required by § 91.103 – conduct a subsequent preflight availability prediction for the planned flight to ensure that GPS performance is still predicted to comply with the performance requirements of § 91.227(c)(1)(i) and (iii).

The duty under § 91.103 to conduct a subsequent preflight availability prediction for an intended route of flight will cease once an operator receives an ATC route clearance for the intended operation. More specifically, if an operator receives a satisfactory preflight availability prediction and an ATC route clearance for the intended operation, the FAA will consider the operator as having exercised its due diligence in ensuring the intended operation complies with the performance requirements in § 91.227. Therefore, upon receiving a satisfactory preflight availability prediction and an ATC clearance for an intended route of flight, the operator will be



deemed to have complied with the preflight availability prediction requirement and the performance requirements of § 91.227(c)(1)(i) and (iii).

The FAA recognizes that there are circumstances outside the operator's control that may result in unanticipated changes to an operator's planned route of flight, which may cause temporary degraded GPS performance and technical noncompliance with § 91.227(c)(1)(i) and (iii). For example, ATC will continue to exercise its responsibility for the safe and efficient movement of air traffic, including changes to the routing of traffic to achieve those objectives. In addition, a planned route of flight may be changed due to environmental conditions, such as a thunderstorm, or an operator may experience unexpected GPS degradations during flight. After an ATC route clearance is obtained for the flight, the FAA does not expect an operator to conduct a subsequent preflight availability prediction to accommodate rerouting caused by ATC or environmental conditions.

The FAA notes that the policy described above applies only to those operators who have exercised due diligence required in § 91.103 by performing a preflight availability prediction. For example, if an operator fails to conduct a required preflight availability prediction for the operator's intended operation and subsequently encounters technical non-compliance with the performance requirements of § 91.227(c)(1)(i) and (iii), that operator will be deemed to have violated the ADS-B rule even if the operator's flight were rerouted due to unforeseen circumstances.

When an operator performs a preflight availability prediction using the FAA's SAPT tool, the SAPT retains a record of each transaction enabling the FAA to confirm that an operator took preflight action. The FAA recommends that operators using an alternate tool retain documentation that verifies the completion of the satisfactory preflight availability prediction for each intended route of flight. The FAA recommends that the prediction should be done not more than 24 hours prior to the planned departure. Predictions using SAPT to determine the

availability of backup surveillance per Exemption 12555 should be done within the 3 hours prior to a planned departure.

### **GPS Interference.**

There may be times when the GPS position source cannot meet the required technical performance due to planned GPS interference. In the event of a scheduled interference outage of GPS, the FAA will issue a NOTAM that identifies the airspace and time periods that may be affected by the interference. The affected area will frequently encompass a large radius of ADS-B Out rule airspace. The FAA finds that requiring operators to avoid the affected area would cause significant disruption to air traffic in that vicinity. Furthermore, there is no guarantee that these operators would experience actual interference and a degradation in GPS performance in the area. For these reasons, the FAA has determined that it would be impractical and not in the public interest to require operators to avoid the affected area based on the chance that an otherwise compliant flight could experience GPS interference.

Accordingly, operators should proceed with their intended operation if the only anticipated ADS-B noncompliance would be due to the planned GPS interference. Under this policy, an operator who is required to perform a preflight availability prediction for the intended route of flight is still required to obtain a satisfactory preflight availability prediction. When a NOTAM identifies the airspace and time periods that may be affected by GPS interference, an operator will not be required to alter his or her route of flight to avoid the area based solely on that NOTAM. As explained in the preamble to the final rule, if an aircraft's avionics meet the performance requirements but unexpected GPS degradations during flight inhibit the position source from providing adequate accuracy and integrity, ATC will be alerted via the aircraft's broadcasted data and services will be provided to that aircraft using the backup strategy. If an operator encounters actual GPS interference during their flight that results in a degradation of ADS-B Out performance, the policy described above will apply provided the operator has taken the appropriate preflight actions.

## **SAPT Outages**

As noted, certain operators are required to use a preflight availability prediction tool prior to a planned flight. Some operators will use the FAA SAPT for this purpose. The FAA intends that SAPT will be continuously available to operators. However, because unexpected circumstances could lead to a SAPT outage, the inability to access the tool could have an adverse impact on operators with SA-On receivers. As previously noted in Advisory Circular (AC) 90-114, *ADS-B Operations*, ATC will issue a NOTAM announcing when the SAPT is not available.

The FAA understands that a SAPT outage prevents those operators who hold relief under Exemption No. 12555 from confirming the availability of back-up surveillance as required under the exemption's conditions and limitations.<sup>9</sup> It also reduces the ability of non-exemption holders without their own preflight availability prediction tool to determine that a particular operation will meet the performance requirements prior to conducting an operation. The unavailability of the SAPT for brief periods would result in operators having to choose between conducting flights that might result in non-compliance or not conducting an operation that might have complied with ADS-B Out rule performance. The FAA does not intend to inhibit operators from conducting otherwise permissible operations when the SAPT is unavailable. As such, when there is a SAPT outage, the policy described above will apply to operators who rely on the SAPT if their operation falls below the performance requirements.

### **III. Summary**

Unless otherwise authorized by ATC, all aircraft operating in the airspace identified in § 91.225 must comply with the ADS-B Out performance requirements in § 91.227. Under the FAA's revised policy, aircraft equipped with SA-Aware GPS receivers described in this document are not required to perform a preflight service availability prediction, including those

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<sup>9</sup> The FAA anticipates that any outage would be of short duration and any potential risk would be minimal because, concurrent with the outage, GPS performance would have to fall below rule values on the route of flight and radar coverage would have to be unavailable at the same time and location.

aircraft not covered by Exemption 12555. Aircraft equipped with SA-On receivers should continue performing preflight availability predictions and can use the guidance contained in AC 90-114, *ADS-B Operations*, when conducting preflight actions for operations planned within airspace described in § 91.225. Holders of Exemption 12555 must continue to meet the conditions and limitations associated with the exemption. Holders of Exemption 12555 should revise applicable equipage plans to reflect any changes affected by policy contained in this document and submit revised plans to the FAA per conditions specified by the exemption.

As described in this document, there are circumstances outside of an operator's control that may result in a temporary degradation of GPS performance and an apparent violation of § 91.227. An operator may exercise due diligence in performing a preflight availability prediction for its intended route of flight but experience rerouting by ATC after obtaining an initial ATC route clearance, which may cause an unanticipated degradation of performance. Additionally, an operator may encounter actual GPS interference on its intended path of flight, which would affect the ability of an aircraft to meet the performance requirements of § 91.227. Lastly, an operator may not be able to complete a preflight availability prediction for its intended route of flight due to the FAA's SAPT being out of service. As previously explained, the FAA recognizes that these situations are outside of the operator's control. Therefore, the FAA will not take legal enforcement action for apparent noncompliance with § 91.227 due to the circumstances discussed in this document to the extent such an application would impose a standard of conduct wholly outside the operator's control.

#### **IV. Effective Date**

Policy in this document is effective immediately and supersedes policy contained in FRN Docket No. FAA-2019-0539. Additional information on the policy described in this document will be contained in the next revision of AC 90-114, *ADS-B Operations*.

Gregory E. Schwab,  
Acting Chief of Staff, Air Traffic Organization.

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